

P1

Algebra

$$a^m \times a^n = a^{m+n}$$

$$(a^m)^n = a^{mn}$$

$$a^m / a^n = a^{m-n}$$

$$a^0 = 1$$

$$a^{-m} = 1 / a^m$$

$$a^{1/m} = \sqrt[m]{a}$$

$$a^{m/n} = \sqrt[n]{a^m}$$

If $f(x)$ is a polynomial and $f(a) = 0$ then $(x - a)$ is a factor of $f(x)$.

Trigonometry

| | sin | cos | tan |
|----|------------------|------------------|------------------|
| 30 | 1/2 | $(\sqrt{3}) / 2$ | $1 / (\sqrt{3})$ |
| 45 | $1 / (\sqrt{2})$ | $1 / (\sqrt{2})$ | 1 |
| 60 | $(\sqrt{3}) / 2$ | 1/2 | $\sqrt{3}$ |

$$\sin(-x) = -\sin x$$

$$\cos(-x) = \cos x$$

$$\tan(-x) = -\tan x$$

$$\sin^2 x + \cos^2 x \equiv 1$$

$$\tan x = (\sin x) / (\cos x)$$

Coordinate geometry in the xy-plane

If two lines are parallel their gradients are equal.

If two lines are perpendicular the product of their gradients is -1

Sequences and Series

Let a = first term of a sequence, d = the difference in an arithmetic series, r = the ratio in a geometric series.

n th term of an arithmetic series:

$$U_n = a + (n - 1)d$$

sum of an arithmetic series:

$$0.5 n [2a + (n - 1)d]$$

sum of the first n natural numbers (“triangle numbers”):

$$0.5 n (n + 1)$$

n th term of a geometric series:

$$ar^{n-1}$$

sum of a finite geometric series ($|r| > 1$)

$$[a(1 - r^n)] / (1 - r)$$

sum of an infinite geometric series ($|r| < 1$)

$$a / (1 - r)$$

Differentiation

$$\text{If } f(x) = kx^n \text{ then } f'(x) = nkx^{n-1}$$

The second derivative, $f''(x)$ tells us if the turning point is a maximum or a minimum. If $f''(x) > 0$ the turning point is a minimum, if $f''(x) < 0$ the turning point is a maximum. If $f'(x) = 0$, $f''(x) = 0$ and $f'''(x) \neq 0$ then the turning point is a point of inflexion.

Integration

Indefinite Integration

$y = f(x) + C$ is the indefinite integral of $y = f'(x)$. C is an arbitrary constant.

$$\int x^n dx = (x^{n+1}) / (n+1)$$

Definite Integration

$$\int_a^b f'(x) dx = [f(x)]_a^b = f(b) - f(a)$$

By using this the region bounded by the curve $f(x)$, the x-axis, the line $x = a$ and the line $x = b$ can be found.

Notation

\Rightarrow stands for “implies”

\Leftarrow stands for “is implied by”

\Leftrightarrow states that the two statements are logically equivalent